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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/864,376	05/25/2001	Tadahiro Ohmi	107176-00007	1605
7590 12/17/2003 ARENT FOX KINTNER PLOTKIN & KAHN PLLC 1050 Connecticut Avenue, N.W. Suite 400 Washington, DC 20036-5339			EXAMINER ZERVIGON, RUDY	
			ART UNIT 1763	PAPER NUMBER

DATE MAILED: 12/17/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/864,376

Applicant(s)

OHMI ET AL.

Examiner

Rudy Zervigon

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 30 September 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-9 and 12-14 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-9 and 12-14 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
 - 2) ☐ Certified copies of the priority documents have been received in Application No. _____.
 - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
- a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Claim Objections

1. Claims 2, 4, and 8 are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claims, or amend the claims to place the claims in proper dependent form, or rewrite the claims in independent form. Dependent claims 2, 4, and 8 claim a broader range than their respective independents.

Claim Rejections - 35 USC § 103

2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

3. Claims 1-5, 7, 8, 9, 12, and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sato et al (USPat. 5,861,601) in view of Otsubo et al (USPat. 4,985,109). Sato teaches a plasma processing apparatus (Figure 2) including:

- i. A processing chamber (3, Figure 2)
- ii. A microwave (6, Figure 2) radiating antenna / radiating surface (41, Figure 2; column 9, lines 6-30)
- iii. A dielectric body (4, Figure 2; column 4, lines 25-35)
- iv. A distance "D" between the microwave radiating antenna surface (41, Figure 2; column 9, lines 6-30) and a surface of the dielectric body is shown by Sato et al in Figure 2
- v. Sato et al teaches a dielectric plate as discussed above.

Sato does not teach a specific thickness for his dielectric plate. Sato does not teach a slot antenna where a part of the number of slots is closed. Sato does not teach forming a standing wave

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microwave between his microwave radiating surface (41; Figure 2) and his plasma exciting surface (4; Figure 2 – the lower surface of the dielectric body).

Otsubo teaches a slot antenna (Figure 2) in a microwave plasma reactor (Figure 1) having a number of slots (5a) formed and distributed in the microwave radiating surface where a part of the number of slots can be closed (column 7, lines 3-15). Otsubo further teaches a standing wave (column 19, lines 31-37) microwave between his microwave radiating surface (5; Figure 13) and his plasma exciting surface (4; Figure 13 – the lower surface of the quartz plate) – “...the standing wave of the microwaves is generated between the slot plate 5 and the stage 7”.

It would have been obvious to one of ordinary skill in the art at the time the invention was made for Sato to optimize the thickness of the dielectric plate, and for Sato to use Otsubo's slot antenna during standing wave microwave propagation.

Motivation for Sato to optimize the thickness of the dielectric plate is for optimizing the space “between the slot antenna and the quartz window 4 through which the microwaves pass so that the microwaves emitted from the slot antenna have room to expand” (column 9, lines 6-30) as taught by Otsubo, further, motivation for Sato to use Otsubo's slot antenna under standing wave microwave propagation is for “easy” plasma generation as taught by Otsubo (column 19, lines 35-40).

4. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sato et al (USPat. 5,861,601) in view of Tsuchihashi, Masaaki et al (USPat. 6,109,208). Sato is discussed above. Sato does not teach plural slots of the microwave radiating antenna where the plural slots in the peripheral direction are closed. Sato does not teach a specific thickness for his dielectric plate. Tsuchihashi teaches a similar microwave plasma generating device (Figure 20, 21; column 11,

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lines 37-49) including plural slots (“slits” 6a-d, 10a-d) in the peripheral direction of the shutter antenna (26) where portions of the slots (“slits” 6a-d) in the peripheral direction can be opened (“A” direction; Figure 20) or closed (counter to “A” direction; Figure 20).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to replace Sato’s microwave radiating antenna with Tsuchihashi’s shutter antenna where portions of the slots in the peripheral direction can be opened or closed as taught by Tsuchihashi, and for Sato to optimize the thickness of the dielectric plate.

Motivation to replace Sato’s microwave radiating antenna with Tsuchihashi’s shutter antenna where portions of the slots in the peripheral direction can be opened or closed as taught by Tsuchihashi is for distributing microwaves as taught by Tsuchihashi (column 11, lines 37-49), further, motivation for Sato to optimize the thickness of the dielectric plate is for optimizing the space “between the slot antenna and the quartz window 4 through which the microwaves pass so that the microwaves emitted from the slot antenna have room to expand” (column 9, lines 6-30)

5. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sato et al (USPat. 5,861,601) and Otsubo et al (USPat. 4,985,109) in view of Tsuchihashi, Masaaki et al (USPat. 6,109,208). Sato and Otsubo are discussed above. Sato and Otsubo do not teach plural slots of the microwave radiating antenna where the plural slots in the peripheral direction are closed.

Tsuchihashi teaches a similar microwave plasma generating device (Figure 20, 21; column 11, lines 37-49) including plural slots (“slits” 6a-d, 10a-d) in the peripheral direction of the shutter antenna (26) where portions of the slots (“slits” 6a-d) in the peripheral direction can be opened (“A” direction; Figure 20) or closed (counter to “A” direction; Figure 20).

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It would have been obvious to one of ordinary skill in the art at the time the invention was made to replace Sato and Otsubo's microwave radiating antenna with Tsuchihashi's shutter antenna where portions of the slots in the peripheral direction can be opened or closed as taught by Tsuchihashi.

Motivation to replace Sato and Otsubo's microwave radiating antenna with Tsuchihashi's shutter antenna where portions of the slots in the peripheral direction can be opened or closed as taught by Tsuchihashi is for distributing microwaves as taught by Tsuchihashi (column 11, lines 37-49).

Response to Arguments

6. Applicant's arguments filed September 30, 2003 have been fully considered but they are not persuasive.

7. Applicant's response to the objection of claims 2, 4, and 8 is not persuasive. Claims 2, 4, and 8 remain objected to because said claims claim a broader range, by a factor of 2, than the claims from which they depend. Correction is still required.

8. Applicant states that Sato does not teach forming a standing wave. The Examiner agrees: "Sato does not teach forming a standing wave microwave between his microwave radiating surface (41; Figure 2) and his plasma exciting surface (4; Figure 2 – the lower surface of the dielectric body)." As was asserted initially by the Examiner.

9. Applicant states that Otsubo does not teach "a standing wave of a microwave is formed between the microwave radiating surface of the antenna and a lower surface of a quartz plate by determining the distance there between based on the wavelength of the microwave, as defined by the claimed invention." However, it was asserted by the Examiner that:

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“Otsubo further teaches a standing wave (column 19, lines 31-37) microwave between his microwave radiating surface (5; Figure 13) and his plasma exciting surface (4; Figure 13 – the lower surface of the quartz plate) – “...the standing wave of the microwaves is generated between the slot plate 5 and the stage 7 ”.” That Otsubo is silent with respect to the relative positions and/or thickness of Otsubo’s microwave radiating surface (5; Figure 13) and his plasma exciting surface (4; Figure 13 – the lower surface of the quartz plate) based on the wavelength of the microwave is recognized. However, the Examiner believes that said relative positions and/or thickness of Otsubo’s microwave radiating surface and Otsubo’s plasma exciting surface that sustain Otsubo’s standing wave is an optimizable quantity as taught by Otsubo: Motivation for Sato to optimize the thickness of the dielectric plate is for optimizing the space “between the slot antenna and the quartz window 4 through which the microwaves pass so that the microwaves emitted from the slot antenna have room to expand” (column 9, lines 6-30) as taught by Otsubo”.

10. Applicant believes that Otsubo’s apparatus does not produce a standing wave:

“

In other words, the standing wave is not generated between the slot plate 5 and the lower surface of the quartz plate 4. As a result, Otsubo fails to teach or...

”

In response, the Examiner cites Otsubo’s teachings of column 19, lines 20-40:

“

In this case, if the microwaves are radiated into the processing chamber 6, the standing wave of the microwaves is generated between the slot plate 5 and the stage 7 and effect preventing of attenuation of the electric field intensity of the radiated microwaves, whereby the plasma can be

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generated easily.

“

As a result, and because both Otsubo's slot plate 5 and quartz plate 4 are elements between Otsubo's slot plate 5 and the stage 7, Otsubo then identically teaches “the standing wave is not generated between the slot plate 5 and the lower surface of the quartz plate 4.”.

Conclusion

11. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

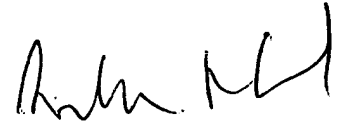
12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Rudy Zervigon whose telephone number is (703) 305-1351. The examiner can normally be reached on a Monday through Thursday schedule from 8am through 7pm. The official after final fax phone number for the 1763 art unit is (703) 872-9311. The official before final fax phone number for the 1763 art unit is (703) 872-9310. Any Inquiry of a general nature or relating to the status of this application or proceeding should be directed to

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the Chemical and Materials Engineering art unit receptionist at (703) 308-0661. If the examiner can not be reached please contact the examiner's supervisor, Gregory L. Mills, at (703) 308-1633.

A handwritten signature in black ink, appearing to read "Jeffrie R. Lund". The signature is stylized with a large, looped "J" and a distinct "L".

**JEFFRIE R. LUND
PRIMARY EXAMINER**